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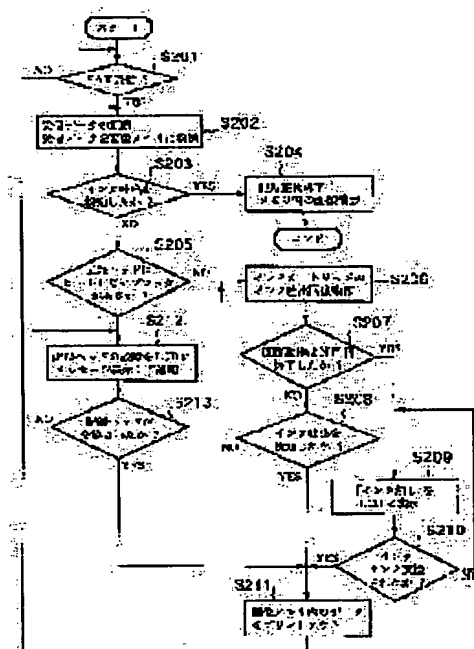
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## (54) FACSIMILE APPARATUS

(57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a facsimile apparatus which analyzes a cause of fault in discharging ink, notifies a user of the cause and can recover from the faulty state in discharging ink immediately.

**SOLUTION:** When a fault in discharging ink from an ink-jet recording head is detected, a cause of the fault in ink discharge, for example, a breakdown of recording head, clogging of a nozzle of the recording head, running-out of ink and the like are specified. Accordingly to the specified faulty cause in discharging ink, messages are displayed and a recording action is recovered.



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**CLAIMS**

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[Claim(s)]

[Claim 1] It is the facsimile apparatus which uses the exchangeable ink tank which holds the ink supplied to an exchangeable ink jet recording head and said ink jet recording head for record to a record medium. The means of communications which transmits and receives facsimile data between communication lines, and a storage means to store temporarily the facsimile data received through said communication line, When the poor ink regurgitation is detected by a detection means to detect the ink discharge condition from said ink jet recording head, and said detection means Facsimile apparatus characterized by having a specific means to specify the cause of said poor ink regurgitation, and a display means to display a message according to the poor ink regurgitation cause specified by said specific means.

[Claim 2] Facsimile apparatus according to claim 1 characterized by having further a recovery means to recover said ink jet recording head, a temperature detection means to detect the internal temperature of said ink jet recording head, and the driving means that divides two or more record components of said ink jet recording head into two or more blocks, impresses a driving pulse in time sharing for every block, and carries out time-sharing actuation of said ink jet recording head.

[Claim 3] Said specific means carries out time-sharing actuation of said ink jet recording head using said driving means. A 1st distinction means to distinguish whether a temperature change is in the interior of said ink jet recording head according to the detection result from said temperature detection means for every actuation of each block, Facsimile apparatus according to claim 2 characterized by having a 2nd distinction means to distinguish whether the poor ink regurgitation still continues according to the detection result which said detection means is operated again and obtained after said recovery means performs recovery action.

[Claim 4] It is the facsimile apparatus according to claim 3 characterized by to display

the 2nd message of a purport which said display means has failure in said ink-jet recording head, the 1st message of a purport which needs to exchange an ink-jet recording head is displayed according to the distinction result by said 1st distinction means, and said display means does not have ink in said ink tank according to the distinction result by said 2nd distinction means, and needs to exchange an ink tank.

[Claim 5] Said 2nd distinction means is facsimile apparatus according to claim 3 characterized by distinguishing ink existence after performing recovery action of the count of predetermined.

[Claim 6] Facsimile apparatus according to claim 4 characterized by having further the control means controlled to record again based on the facsimile data stored in said storage means when exchanged in an ink jet recording head or an ink tank according to the 1st or 2nd message by said display means.

[Claim 7] Facsimile apparatus according to claim 6 characterized by having further the recovery record control means controlled to record again based on the facsimile data stored in said storage means when said 2nd distinction means distinguishes that the poor regurgitation of ink was solved by the recovery action in said count of predetermined.

[Claim 8] Said control means is facsimile apparatus according to claim 6 characterized by detecting whether said detection means is driven and the poor ink regurgitation is after record is performed again.

[Claim 9] Facsimile apparatus according to claim 8 characterized by having further a storage control means to control to eliminate the facsimile data stored in said storage means when it is checked from the detection result by said detection means that said record for the second time is made normally.

[Claim 10] Said detection means is facsimile apparatus according to claim 1 characterized by to have a measurement means measure the time amount by which said light is intercepted between a luminescence means to emit light in light to the location through which the ink breathed out from the ink delivery of said ink jet recording head passes, a light-receiving means to receive said light, and said luminescence means and said light-receiving means.

[Claim 11] Said detection means is facsimile apparatus according to claim 10 characterized by having further a comparison means [ threshold / time amount / which was measured by said measurement means ], and detecting said poor ink regurgitation according to the comparison result by said comparison means.

[Claim 12] Said ink jet recording head is facsimile apparatus according to claim 1 characterized by having the electric thermal-conversion object for generating the heat

energy given to ink in order to carry out the regurgitation of the ink using heat energy.  
[Claim 13] Said display means is facsimile apparatus according to claim 1 characterized  
by including LCD.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the facsimile apparatus which records especially using an ink jet recording head about facsimile apparatus.

[0002]

[Description of the Prior Art] With the ink jet recording device with the function which detects the conventional poor ink regurgitation, the existence of an ink residue was judged by investigating the output of the sensor which changes with the ink breathed out so that the optical axis of the light irradiated from the light emitting device of the ink sensor of a formula to the photo detector in the photograph in TARAPU evening might be intercepted according to quantity of light change which the photo detector receives.

[0003] Moreover, in the conventional ink jet recording apparatus, ink was made to breathe out compulsorily from the ink cartridge, and recovery action which prevents the poor regurgitation by fixing of ink, the eye, i.e., \*\*\*\*\*, of an ink regurgitation nozzle of a recording head, was performed regardless of the existence of ink.

[0004]

[Problem(s) to be Solved by the Invention] However, although it could detect that ink was not breathed out after performing ink discharging and the existence of an ink residue could be judged in the above-mentioned conventional example, it was undetectable that it becomes a cause that a certain malfunction is in the ink cartridge containing a recording head or its recording head itself for example, and ink discharging is not made, and ink is not breathed out.

[0005] Therefore, in facsimile apparatus using an ink jet recording apparatus as the Records Department, in a recording head, the malfunction of an ink cartridge, or failure, the poor ink regurgitation cannot be detected, and the image cannot be recorded at the

time of facsimile reception, but the record form of a blank paper will be outputted. in such a case, a thing [ an ink residue ] without a user -- or there was also a problem that it could not judge whether it is failure of a recording head or an ink cartridge.

[0006] Moreover, since recovery action was performed regardless of the condition of ink existence, there was a problem which consumes ink vainly.

[0007] It aims at offering the facsimile apparatus cut since this invention was made in view of the above-mentioned conventional example, analyzes the cause of the poor ink regurgitation, notifies a user of the cause and recovery from a poor ink regurgitation condition is aimed at promptly.

[0008]

[Means for Solving the Problem] In order to attain the above-mentioned object, the facsimile apparatus of this invention consists of the following configurations.

[0009] Namely, it is the facsimile apparatus which uses the exchangeable ink tank which holds the ink supplied to an exchangeable ink jet recording head and said ink jet recording head for record to a record medium. The means of communications which transmits and receives facsimile data between communication lines, and a storage means to store temporarily the facsimile data received through said communication line, When the poor ink regurgitation is detected by a detection means to detect the ink discharge condition from said ink jet recording head, and said detection means It has the facsimile apparatus characterized by having a specific means to specify the cause of said poor ink regurgitation, and a display means to display a message according to the poor ink regurgitation cause specified by said specific means.

[0010] Furthermore, it is good to have a recovery means to recover said ink jet recording head, a temperature detection means to detect the internal temperature of said ink jet recording head, and the driving means that divides two or more record components of said ink jet recording head into two or more blocks, impresses a driving pulse in time sharing for every block, and carries out time-sharing actuation of said ink jet recording head.

[0011] Said specific means carries out time-sharing actuation of said ink jet recording head using said driving means. A 1st distinction means to distinguish whether a temperature change is in the interior of said ink jet recording head according to the detection result from said temperature detection means for every actuation of each block, After said recovery means performs recovery action, it is desirable to have a 2nd distinction means to distinguish whether the poor ink regurgitation still continues according to the detection result which said detection means is operated again and obtained.

[0012] And it is good to display the 2nd message of a purport which said display means does not have ink in an ink tank according to the distinction result by the 2nd distinction means by said display means' having failure in an ink jet recording head, and displaying the 1st message of a purport which needs to exchange the ink jet recording head according to the distinction result by the 1st distinction means, and needs to exchange the ink tank.

[0013] Here, after the 2nd distinction means performs recovery action of the count of predetermined, it is desirable to distinguish ink existence. On the other hand, when the 2nd distinction means distinguishes that the poor regurgitation of ink was solved by the recovery action in the count of predetermined, it is good to control to record again based on the facsimile data stored in said storage means.

[0014] Furthermore, when exchanged in an ink jet recording head or an ink tank according to the 1st or 2nd message, it is desirable to control to record again based on the facsimile data stored in said storage means. In addition, when it is checked that detect whether said detection means is driven and there is any poor ink regurgitation, and record for the second time is made normally after [ that ] record was performed again, it is good to control to eliminate the facsimile data stored in said storage means.

[0015] Now, a luminescence means to emit light in light to the location through which the ink in which said detection means was breathed out from the ink delivery of said ink jet recording head passes, A measurement means to measure the time amount by which said light is intercepted between a light-receiving means to receive said light, and said luminescence means and said light-receiving means, Furthermore, it is desirable to have a comparison means [ threshold / time amount / which was measured by said measurement means ], and to consider as the configuration which detects the poor ink regurgitation according to the comparison result.

[0016] In addition, in order to carry out the regurgitation of the ink using heat energy, as for said ink jet recording head, it is desirable to have the electric thermal-conversion object for generating the heat energy given to ink.

[0017] Moreover, as for said display means, it is desirable that LCD is included.

[0018] By the above configuration, it operates so that this invention may specify the cause of the poor ink regurgitation and may display a message according to the specified poor ink regurgitation cause, when the poor ink regurgitation from an ink jet recording head is detected.

[0019]

[Embodiment of the Invention] With reference to an accompanying drawing, the suitable operation gestalt of this invention is explained to a detail below.



[0020] Drawing 1 is the sectional side elevation showing the configuration of facsimile apparatus equipped with the Records Department which records by the recording head according to the ink jet method which is the typical operation gestalt of this invention.

[0021] The outline configuration of facsimile apparatus is explained with reference to drawing 1. In drawing 1, the read station in which A reads a manuscript optically, the Records Department where B records according to an ink jet method, and C are the feed sections which separate at a time one record medium, such as the recording paper P loaded into the sheet paper cassette, and are supplied to the Records Department B.

[0022] First, it explains that the recording paper P flows. The conveyance path of the recording paper P is as an arrow head G showing. That is, the recording paper P loaded into the sheet paper cassette 1 of the feed section C is taken up by the feed roller 2 and the retard roller 3, and is sent into the Records Department B with the feed roller 2. At the Records Department B, the recording paper P is conveyed according to the record, recording by breathing out ink on the recording paper P by the recording head 5. And termination of record carries out blowdown loading of the recording paper P with the delivery roller 6 at the delivery stacker 7.

[0023] Next, the concrete configuration of the feed section C is explained.

[0024] In drawing 1, the sheet paper cassette 1 which carries out two or more sheet loading receipt of the recording paper P is equipped with the medium plate 4 loading the recording paper P. The medium plate 4 is energized more nearly up than a rear face with the medium plate spring 10 by which opposite arrangement is carried out with the feed roller 2. Moreover, when the medium plate 4 was pressed below by the cam etc. at the time of feed standby, and the recording paper P decreases or it is lost, it has easily structure in which an extension is possible in the recording paper.

[0025] On the other hand, when detecting a record signal and starting feed actuation, lower part press of the medium plate 4 by a cam etc. is canceled, and the recording paper P is taken up by the feed roller 2. The retard roller 3 is in the location which counters with the feed roller 2, is interlocked with a medium plate 4, and changes the location of the recording paper P. When performing feed actuation, it is energized by the medium plate 4 and the separation feed only of the one sheet of a maximum upside is carried out for the recording paper P taken up with the feed roller 2 according to a collaboration operation with the feed roller 2 in the J section. The recording paper P by which separation feed was carried out is conveyed by the Records Department B, pinching so that it may coil around the feed roller 2 enough.

[0026] Furthermore, the blowdown device of the recording paper P recorded at the Records Department B is explained.

[0027] Delivery loading of the recording paper P discharged with the delivery roller 6 is carried out at the delivery stacker 7. The delivery auxiliary tray 9 on which the delivery stacker 7 makes the hinge K section a center of rotation is formed, the recording paper P to be used can make it able to rotate, when longwise, and a delivery stacker can be lengthened in the recording paper delivery direction. Furthermore, the delivery stacker 7 has structure which serves as covering of a sheet paper cassette 1. In addition, the detail paper P with which two or more ribs (un-illustrating) are prepared in the delivery stacker 7 and the delivery auxiliary tray 9, and record was made slides on two or more those rib top, and sequential loading is carried out.

[0028] Furthermore, it explains that the image manuscript S flows.

[0029] A manuscript conveyance way is as an arrow head F showing to drawing 1. In drawing 1, the image manuscript S turns the image side down, and is loaded into the manuscript loading tray 41. As for the image manuscript S loaded into the manuscript loading tray 41, positioning is performed crosswise [ the ] by the movable slider 42. If the image manuscript S is loaded into the manuscript loading tray 41, the manuscript is pressed by the preliminary conveyance press piece 43 with the preliminary conveyance spring 44 from the upper part, it will be sold according to a collaboration operation with the separation roller 46, and preliminary conveyance will be carried out.

[0030] Next, the image manuscript S by which preliminary conveyance was carried out carries out separation conveyance one sheet at a time from the bottom according to a collaboration operation with the sequestrum 45 and the separation roller 46 pressed with the ADF spring 47 from the upper part. Furthermore, the separation roller 46 serves as the role which reads the separated image manuscript S and a location is made to convey. Thus, the image drawn on the image manuscript S by which read with the separation roller 46 and separation conveyance was carried out to the location is read by the photo-electric-translation sensor 48. Now, with CS press spring 50, there is the CS roller 49 along the reading line of the photo-electric-translation sensor 48, it is energized, reads the image manuscript S by which separation conveyance was carried out, and is made to stick it to a line from the upper part. Furthermore, the CS roller 49 serves as the role which discharges the image manuscript S which ended reading while determining the reading rate of the direction of vertical scanning of the image manuscript S (the conveyance direction of an image manuscript). At the end, delivery loading of the discharged image manuscript S is carried out at the manuscript paper output tray 51. In addition, the manuscript paper output tray 51 has structure removable on the body of equipment.

[0031] Drawing 2 is the solid perspective view showing the detailed configuration of the

Records Department B. As shown in drawing 2 , when a recording head and its ink tank are disengageable although a recording head 5 builds in an ink tank, ink is lost and a recording head breaks down only an ink tank again, only a recording head is included in an independently exchangeable discrete-type ink cartridge. Moreover, for example, it measures the interior temperature of a head inside a recording head 5, a sensor like diode is formed and the sensor output can be transmitted to the control section mentioned later.

[0032] In addition, the ink tank and the recording head are united instead of the discrete-type ink cartridge, and when ink is lost, the one apparatus ink cartridge which can be exchanged for a new article the whole recording head can also be used. However, in this case, if either of the failures of an ink piece or a recording head occurs, it is necessary to exchange the whole ink cartridge.

[0033] Furthermore it continues and the configuration of the Records Department B is explained with reference to drawing 2 .

[0034] The both-way migration of the carriage 15 is made to carry out in the direction (a main scanning direction, the direction of arrow-head H) which intersects perpendicularly with the conveyance direction (the direction of vertical scanning, the direction of arrow-head G) of the recording paper P in drawing 2 , holding a recording head 5 with a sufficient precision. Moreover, carriage 15 dashes with the guide rod 16, and is held by section 15a free [ sliding ]. Both-way migration of carriage 15 is performed by the pulley 17 and timing belt 18 which are driven by the carriage motor 30 (un-illustrating), and the record signal and power which are given to a recording head 5 at this time are supplied from the electrical circuit of the body of equipment by the flexible cable 19. The recording head 5 and the flexible cable 19 carried out the pressure welding of the mutual contact, and have connected.

[0035] Moreover, cap 20 is formed in the home position of the carriage 15 of the Records Department B, and it functions as an ink sink stage. If needed, at the time of taking up and down and lifting, cap 20 is stuck to a recording head 5, and prevents evaporation of bonnet ink, and adhesion of dust for the nozzle section. In the cap 20, the pump for attracting the ink regurgitation nozzle of a recording head 5, and performing attraction recovery is formed, and the cleaning blade (un-illustrating) for wiping further the ink which adhered to the ink regurgitation side of a recording head 5 along the migration direction of a recording head 5 near the cap 20 is prepared. By actuation of these pumps or a cleaning blade, attraction blowdown of the ink is carried out from the ink regurgitation nozzle of a recording head, or the ink which fixed to the ink regurgitation side of a recording head is removed, and normal ink discharging is recovered. These

actuation is called recovery action.

[0036] Now, with this equipment, in order to position so that a recording head 5 and cap 20 may serve as a location which countered relatively, gobo 15b prepared in the carriage home sensor 21 formed in the body of equipment and carriage 15 is used. When a photo interrupter is used for the carriage home sensor 21, carriage 15 moves and it moves to a position in readiness, it detects that the light irradiated from some carriage home sensors 21 is in the location where the recording head 5 and the cap 20 countered relatively by gobo 15b using the transparency being interrupted.

[0037] Paper is fed to the recording paper P more nearly up than a drawing Nakashita side, and with the feed roller 2 and the paper guide 22, it is bent horizontally and conveyed in the direction (the direction of vertical scanning) of arrow-head G. Respectively the feed roller 2 and the delivery roller 6 are driven by the record motor (un-illustrating), are interlocked with both-way migration of carriage 15 if needed, and convey the recording paper P in the direction of vertical scanning to high degree of accuracy. Moreover, the roller 23 which is built with a water-repellent high ingredient in the direction of vertical scanning, and contacts the recording paper P only in the periphery section of the shape of the cutting edge is formed. A roller 23 is the location which counters the delivery roller 6, on shaft 23a, it carries out predetermined length alienation, is arranged in the main scanning direction by two or more places, and guides and conveys the recording paper P, without affecting an image, even if it contacts the non-established image in the record paper immediately after record.

[0038] As shown in drawing 3 , photosensor 8 is arranged in the location which countered between the cap 20 and the paper end of the recording paper P at nozzle train 5c of a recording head 5, is a photo interrupter which detects directly optically the ink droplet breathed out from the nozzle of a recording head 5, and can judge a condition without the ink of a recording head 5 from the output.

[0039] The photosensor 8 used here uses infrared radiation LED for a light emitting device, really fabricates a lens in an LED luminescence side, and can project light on parallel about towards a photo detector. A photo transistor is used for a photo detector, a 0.7mmx0.7mm hole is formed in the light-receiving side of a photo detector on an optical axis of a mould member, and 0.7mm and the cross direction are narrowing down the detection range to 0.7mm in the height direction in the whole region between a photo detector and light emitting devices. Moreover, the optical axis which connects a light emitting device and a photo detector is arranged at nozzle train 5c of a recording head 5, and parallel, and if spacing of a photo detector and a photo detector is larger than nozzle train 5c of a recording head 5 and the location of nozzle train 5c of an optical axis and a

recording head 5 is in agreement, all the ink droplets breathed out from each nozzle of a recording head 5 have composition which can pass through the detection range between a light emitting device and a photo detector. When an ink droplet passes through the detection range, an ink droplet interrupts the light from a luminescence side, the quantity of light by the side of light-receiving is decreased, and change of the output of the photo transistor which is a photo detector is obtained.

[0040] That is, if ink is breathed out, while the meantime, i.e., ink, has interrupted the optical axis of photosensor 8, the output from a photo transistor declines, but if ink is not breathed out, the output from a photo transistor does not decline, without ink interrupting the optical axis of photosensor 8. In addition, since it is reversed and the output of a photo transistor is outputted with this operation gestalt, if the output of photosensor 8 will serve as high level "H" if ink is breathed out from the recording head, and there is no ink regurgitation, the output of photosensor 8 will serve as a low level "L." It is sent out through the signal line with which this signal mentions a detection pulse, and a call and its output detection pulse later with this operation gestalt.

[0041] In order to position the nozzle train and photosensor 8 of a recording head 5 so that it may become the location which countered relatively, the carriage home sensor 21 formed in the body of equipment is used like positioning with cap 20.

[0042] With this operation gestalt, as shown in drawing 3, the distance (L) which moves to the optical axis of photosensor 8 from the location of nozzle train 5c of the recording head 5 at a home position (H.P.) is converted into the number of steps of a motor which drives carriage 15, and it is set as the control program which performs record actuation beforehand as a constant. Thus, after detecting a home position, it can position by moving constant-rate carriage at accuracy in the location where the location of the ink train of a recording head 5 and the optical axis of photosensor 8 countered relatively.

[0043] Drawing 4 is the block diagram showing the control configuration of the facsimile apparatus shown in drawing 1.

[0044] In drawing 4, 24 is a control section for controlling the whole equipment, and a control section 24 is used as a hit working area for ROM26 and CPU25 which have memorized the control program which CPU25 and CPU25 perform, and various data to perform various processings, or has the RAM27 grade for saving temporarily various data (for example, facsimile transmitted and received data).

[0045] As shown in drawing 4, a recording head 5 is connected to a control section 24 through the flexible cable 19, and the control signal line to a recording head 5, the picture signal line, and the sensor output signal line from temperature sensor 5a built in the recording head 5 are contained in the flexible cable 19 from the control section 24.

Moreover, the output of photosensor 8 is evaluated by the A/D-conversion circuit 28, and has composition in which analysis is possible by CPU25. The carriage motor 30 is a pivotable motor by the pulse number of steps by the motorised circuit 32. Furthermore, the control section 24 controlled [ the carriage motor 30 ] the reading motor 52 for the conveyance motor 31 through the motorised circuit 53 through the motorised circuit 32 through the motorised circuit 33, and has inputted the output from the carriage home sensor 21.

[0046] A control section 24 receives the printer interface 54 which receives the reading sensor 48, and the record instruction from an external computer 56 and record data, the modem 60 which performs the modulation and a recovery of a facsimile transmitted and received data, and the facsimile received data from a dial-up line 57, or has connected image entry-of-data equipments, such as the line-control circuit (NCU) 55 used as the interface for outputting facsimile transmit data, to a dial-up line 57, and can operate as a printer of facsimile transmission and reception and a copy, and an external computer further again.

[0047] The control section 24 has connected the control panel 58 equipped with the key to which an equipment user performs various actuation and directions further again. From a control panel 58, it can direct whether display the message (abnormality informative message) which shows the purport to which ink residue detection is not carried out normally in poor ink regurgitation detection and advice processing in which it explains below. LCD59 for performing a message indicator is formed in the control panel 58.

[0048] Next, the poor ink regurgitation detection and advice using equipment, and record control processing of the above-mentioned configuration are explained with reference to the flow chart shown in drawing 5.

[0049] First, in step S201, if reception of facsimile data is checked, processing progresses to step S202, receives the data, and it will record an image, storing receiving facsimile data in the image memory set as RAM27.

[0050] After record for an one-page record form is completed, processing moves a recording head 5 to the location of photosensor 8, and makes discharging of ink perform in step S203, and it investigates whether ink is breathed out normally. This is made by investigating the width of face of the detection pulse outputted from photosensor 8. That is, if it puts in another way whether the time amount whose detection pulse is high level "H" is shorter than a predetermined threshold (TH), it will investigate whether the width of face (PW) of a detection pulse is smaller than a predetermined threshold (TH).

[0051] Here, when it is  $PW < TH$ , it judges that a recording head 5 is in a poor

regurgitation condition, and processing progresses to step S205. On the other hand, when it is  $PW \geq TH$ , it judges that ink breathed out normally, and processing progresses to step S204, and record actuation judges that it was made normally, deletes receiving facsimile data from an image memory, and ends processing.

[0052] Now, processing investigates whether it is that the cause of the poor ink regurgitation is in failure of a recording head in step S205. That is, a heat pulse is impressed to the heater element which it had in the nozzle for every block the same with dividing into several blocks hundreds of ink regurgitation nozzles with which the recording head 5 was equipped in the usual record actuation, and carrying out time-sharing actuation, it heats in order, the internal temperature of a recording head 5 is measured by temperature sensor 5a for every block, and it checks whether the temperature is rising normally.

[0053] Here, when it is checked that all blocks heat normally, it judges that it is normal to a recording head, and processing progresses to step S206. at step S206, the cause of the poor ink regurgitation is "with no ink" further -- or the eye of the nozzle of "recording head -- that is, -- " -- it is -- in order to judge a thing, recovery action of a recording head is performed.

[0054] At step S207, it judges whether this recovery action was performed N times. Here, since the recovery action of the count of predetermined is not started, either and the ink regurgitation is not detected when judged with the recovery action of eye N time having been completed, the cause of the poor regurgitation is judged to be "with no ink", and processing progresses to step S209. On the other hand, when N time whose count of recovery action is a predetermined count is not reached, processing progresses to step S208. In addition, N time here is a count of a convention managed by the control section 24, and is set up in consideration of conditions, such as a class of ink cartridge, outside air temperature, and humidity.

[0055] And at step S208, like step S203, the ink regurgitation is made normally and investigates whether it is \*\*\*\*\*. Here, when it is checked that the ink regurgitation had been made normally, processing progresses to step S211. On the other hand, if it is checked that the ink regurgitation is not made normally, processing will repeat return recovery action to step S206.

[0056] On the other hand, at step S209, not N-a recovery action is started, and the normal regurgitation of ink cannot be detected, but the cause of the poor regurgitation is judged to be "with no ink", the message of "having no ink" is displayed on LCD59, and exchange of an ink tank is demanded from a user. Then, processing serves as exchange waiting of an ink tank at step S210. Here, exchange of an ink tank is made, and if

actuation in which a user resumes image recording is carried out, processing will progress to step S211.

[0057] Now, while displaying the message of the purport which judges that a recording head has failure when the block which is not normally heated at least one in step S205 is detected, and processing progresses to step S212, and has failure of a recording head in LCD59 and notifying a user, exchange of a recording head is urged. Next, processing serves as waiting for recording head exchange in step S213. Here, it is exchanged in a recording head, and if actuation in which a user resumes image recording is carried out, processing will progress to step S211.

[0058] At step S211, the facsimile received data accumulated in the image memory are read from an image memory, and the image based on the data is recorded on a record form. Then, as for processing, it judges [ return and ] again whether record was completed normally to step S203.

[0059] If the operation gestalt explained above is followed, whenever it performs image recording based on receiving facsimile image data in a record form by 1 page, every [ therefore, ] It investigates whether a recording head has failure by in addition to existence detection of the ink regurgitation by photosensor, impressing a heat pulse to a recording head and carrying out the monitor of the temperature rise of a recording head. Furthermore, a user can be urged to perform treatment based on the cause by specifying the cause of the poor ink regurgitation and carrying out the message indicator of that by performing actuation which combined activation of recovery action, and existence detection of the ink regurgitation by photosensor.

[0060] Thus, it becomes possible to solve promptly the various problems accompanied by the poor ink regurgitation.

[0061] In addition, in the above operation gestalt, although it was explained that the drop breathed out from a recording head was ink, and it was explained that the liquid further held in an ink tank was ink, the hold object is not limited to ink. For example, in order to raise fixable and the water resisting property of a record image or to raise the image quality, a thing like the processing liquid breathed out to a record medium may be held in the ink tank.

[0062] Especially the above operation gestalt is equipped with means (for example, an electric thermal-conversion object, a laser beam, etc.) to generate heat energy as energy used also in an ink jet recording method in order to make the ink regurgitation perform, and can attain the densification of record, and highly minute-ization by using the method which makes the change of state of ink occur with said heat energy.

[0063] About the typical configuration and typical principle, what is performed using



the fundamental principle currently indicated by the U.S. Pat. No. 4723129 description and the 4740796 description, for example is desirable. Although this method is applicable to both the so-called mold on demand and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise which supports recording information and exceeds nucleate boiling Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a recording head is made to produce film boiling and the air bubbles in the liquid (ink) corresponding to this driving signal can be formed by 1 to 1 as a result, it is effective. A liquid (ink) is made to breathe out through opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If a pulse configuration is carried out, since growth contraction of air bubbles will be appropriately performed instancy in this driving signal, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable.

[0064] As a driving signal of this pulse configuration, what is indicated by the U.S. Pat. No. 4463359 description and the 4345262 description is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 description of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, further excellent record can be performed.

[0065] The configuration using the U.S. Pat. No. 4558333 description and U.S. Pat. No. 4459600 description which indicate the configuration arranged to the field to which a delivery which is indicated by each above-mentioned description, a liquid route, and the heat operating surface other than the combination configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) of an electric thermal-conversion object are crooked as a configuration of a recording head is also included in this invention. In addition, it is good also as a configuration based on JP,59-138461,A which indicates the configuration whose opening which absorbs the pressure wave of JP,59-123670,A which indicates the configuration which uses a common slot as the discharge part of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to a discharge part.

[0066] Furthermore, any of the configuration which fills the die length with the combination of two or more recording heads which are indicated by the description mentioned above as a recording head of the full line type which has the die length corresponding to the width of face of the maximum record medium which can record a recording device, and the configuration as one recording head formed in one are

sufficient.

[0067] In addition, the recording head of the exchangeable chip type with which the electric connection with the body of equipment and supply of the ink from the body of equipment are attained may be used by not only the recording head of the cartridge type with which the ink tank was formed in the recording head itself explained with the above-mentioned operation gestalt in one but the body of equipment being equipped.

[0068] Moreover, since record actuation is further made to stability, it is desirable to add the recovery means against a recording head, a preliminary means, etc. to the configuration of the recording device explained above. If these are mentioned concretely, there is a preheating means by the capping means, the cleaning means, the application of pressure or the attraction means, the electric thermal-conversion object, the heating elements different from this, or such combination over a recording head etc. Moreover, it is effective in order to perform record stabilized by having the reserve regurgitation mode in which the regurgitation different from record is performed.

[0069] Furthermore, by constituting not only the recording mode of only mainstream colors, such as black, but a recording head in one as a recording mode of a recording device, even with two or more combination, although it is good, it can also consider as equipment equipped with full color at least one by the double color color of a different color, or color mixture.

[0070] In the gestalt of the operation explained above, although it is explaining as a premise that ink is a liquid Even if it is ink solidified less than [ a room temperature or it ], what is softened or liquefied at a room temperature may be used. Or by the ink jet method, since what carries out temperature control is common as a temperature control is performed for ink itself by within the limits below 70-degreeC more than 30-degreeC and it is in the stability regurgitation range about the viscosity of ink, ink should just make the shape of liquid at the time of activity record signal grant.

[0071] In addition, in order to prevent positively by making the temperature up by heat energy use it positively as energy of the change of state from a solid condition to the liquid condition of ink, or in order to prevent evaporation of ink, the ink which solidifies in the state of neglect and is liquefied with heating may be used. Anyway, ink liquefies by grant according to the record signal of heat energy, and this invention can be applied also when using the ink of the property which will not be liquefied without grant of heat energy, such as that by which liquefied ink is breathed out, and a thing which it already begins to solidify when reaching a record medium. In such a case, ink is good for a porosity sheet crevice or a breakthrough which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric

thermal-conversion object in the condition of having been held as a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each ink mentioned above.

[0072] Furthermore, in addition, as a gestalt of the recording device concerning this invention, although prepared in one or another object as an image printing terminal of information management systems, such as a computer, the gestalt of the reproducing unit combined with others, a reader, etc. and the facsimile apparatus which has a transceiver function further may be taken.

[0073] In addition, even if it applies this invention to the system which consists of two or more devices (for example, a host computer, an interface device, a reader, a printer, etc.), it may be applied to the equipments (for example, a copying machine, facsimile apparatus, etc.) which consist of one device.

[0074] Moreover, it cannot be overemphasized by the object of this invention supplying the storage (or record medium) which recorded the program code of the software which realizes the function of the operation gestalt mentioned above to a system or equipment, and reading and performing the program code with which the computer (or CPU and MPU) of the system or equipment was stored in the storage that it is attained. In this case, the function of the operation gestalt which the program code itself by which reading appearance was carried out from the storage mentioned above will be realized, and the storage which memorized that program code will constitute this invention. Moreover, it cannot be overemphasized that it is contained also when the function of the operation gestalt which performed a part or all of processing that the operating system (OS) which is working on a computer is actual, based on directions of the program code, and the function of the operation gestalt mentioned above by performing the program code which the computer read is not only realized, but was mentioned above by the processing is realized.

[0075] Furthermore, after the program code by which reading appearance was carried out from a storage is written in the memory with which the functional expansion unit connected to the functional expansion card inserted in the computer or a computer is equipped, it is needless to say in being contained also when the function of the operation gestalt which performed a part or all of processing that CPU with which the functional expansion card and functional expansion unit are equipped based on directions of the program code is actual, and mentioned above by the processing is realized.

[0076]

[Effect of the Invention] As explained above, when following this invention and the poor ink regurgitation from an ink jet recording head is detected Since the cause of the poor

ink regurgitation is specified and a message is displayed according to the specified poor ink regurgitation cause. A user can know the cause of the poor ink regurgitation promptly, and is effective in the ability to take promptly the means for canceling the poor ink regurgitation, for example, exchange of an ink jet recording head, exchange of an ink tank, etc.

[0077] thereby, facsimile data are received -- \*\*\*\* -- don't start, but while the ink regurgitation has not been performed by it, record actuation should do -- the form of a blank paper is outputted and it can avoid losing the received image.

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[Translation done.]

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is the sectional side elevation showing the configuration of facsimile apparatus equipped with the Records Department which records by the recording head according to an ink jet method which is the typical operation gestalt of this invention.

[Drawing 2] It is the solid perspective view showing the detailed configuration of the Records Department B of the equipment shown in drawing 1.

[Drawing 3] It is drawing showing the surrounding detailed configuration of the photosensor 8 of the Records Department B.

[Drawing 4] It is the block diagram showing the control configuration of the facsimile apparatus shown in drawing 1.

[Drawing 5] It is the flow chart which shows poor ink regurgitation detection, advice, and record control processing.

**[Description of Notations]**

5 Recording Head

5a Temperature sensor

8 Photosensor

24 Control Section

25 CPU

26 ROM

27 RAM

58 Control Panel

59 LCD

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[Translation done.]